(NASA-CR-170622) BETA EXPERIMENT FLIGHT REPORT Progress Report (Applied Research, Inc.) 29 p HC A03/MF A01 CSCL 20E

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BETA EXPERIMENT FLIGHT REPORT

Contract No. NAS8-34337

August 1982

Prepared for

George C. Marshall Space Flight Center

Marshall Space Flight Center, Alabama 35812

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I. Introduction

Applied Research, Inc. has provided personnel to install and check out the MSFC Beta experiment aboard the CV-990 aircraft at Ames Research Center.

These personnel have participated in initial test flights during June 1982, and have operated the equipment during test flights in July 1982 in the Caribbean. This is a report on these flights. This work was done under Contract NAS8-34337.

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SUMMARY OF BETA FLIGHTS 1 AND 2

The components of the Beta system were unpacked at NASA-AMES on 1 June 1982. Some of the crates had obviously been overturned in transit since the vacuum oil had spilled out the top of the vacuum pump and metal shavings were apparent throughout the laser/optics package. The laser/optical package was cleaned with a vacuum after installation in the aircraft. All installation was completed early on 4 June. During the functional test of the system the laser would not operate. It was discovered that the high voltage output tubes had been removed before shipping. The tubes were located and installed and the laser was tested again. It again would not operate. On 7 June, measurements showed the positive power supply not functioning. A transistor and resistor were replaced and the power supply operated properly. The laser however would still not function. Measurements indicated high voltage at the laser thus indicating a leak in the discharge tube. A leak detector was located and the laser head was removed from the aircraft. Evacuating the laser cavity and probing with Helium revealed a rather large leak in the glass tube connecting the refill valve to the discharge tube. This was repaired with high voltage varnish and the laser was refilled with the gas mixture to a pressure of 20 torr. The laser was installed in the aircraft again and a discharge was struck at approximately the correct voltage (3500 volts). It appeared to operate normally and produced 5 watts measured at the telescope. Alignment was completed and the total system was made ready for the checkout flight.

The problem was then encountered when the computer system would not

function. The flexible disc component was removed from th ck and re-connected to the system in order to have access for troubleshooting. A connector was not making proper contact and was mated more firmly. This enabled operation of the disc drive and it was re-installed. The computer would still not operate however, and it was discovered that a switch on the front panel of the computer had been broken off apparently when the disc drive was removed. This happened because there was so little space between the rack and the aircraft seat to maneuver the disc drive unit. A replacement switch was located and installed and the computer now functioned normally.

The first flight for the purpose of experiment checkout was flown on 10 June. The enclosed chart shows the flight path with a racetrack pattern near Bakersfield being the primary data area. Also of interest are the patterns in the warning zone north-east of Ames over the Pacific Ocean at 26,000 feet altitude where the air should be very clean. This flight went well with single particles apparent to 26,000 feet. The second flight, on 14 June, was the first Beta flight. A chart of the flight path is enclosed as well as a computer plot of the actual flight path. The primary data area was over Owens Valley near Dryden Research Center. This consisted of eleven legs starting at 1500 feet above ground level, climbing at 500 feet per minute up to a final altitude of 39,000 feet above sea level. Volume mode signals of 1-2 db were evident on the spectrum analyzer up to 31,000 feet. Single particle signals could be observed on both the spectrum analyzer, (by tuning it to the center frequency with zero scan width and observing single particle blips) and the oscilloscope as the histograms developed up to 39,000 feet. Three diskettes with approximately 1300 data items

were used with the primary data taken with mirror switching periods of five seconds and level flight data taken with switching periods of ten seconds. Fluctuations of 10-15% in laser discharge current were observed during this flight. The occurence of the fluctuations was very irregular and when the laser power dropped the detector bias voltage would drop through zero. This would cause the noise level at the processor to fluctuate to an extent that thresholding for amplitude measurements was at best intermittent. Increasing the bias voltage to a value 2-3 times normal alleviated this problem. Also the laser was not stable and it was necessary to adjust the cavity length with the PZT drive fairly often to stay on the P-20 transition. This could have been caused by the fluctuations in laser discharge current and/or improper operation of the Lansing stabilizer.

The laser was turned on the day after the first Beta flight and the power output was down significantly and lower laser discharge current indicated that the pressure in the tube was up. The laser was removed from the aircraft and put on the leak detector. The only leak evident was a very small one in the vicinity of the Brewster window. It was impossible to repair a leak there without disassembly of the laser so the laser was pumped for approximately ten hours and filled to 18.8 torr, slightly lower than normal (20torr) so as to extend its lifetime. Upon re-installation in the aircraft, laser power was measured at 5.4 watts in the telescope.

Flight #3 occured on 16 June and was a JPL/Radar flight. Except for takeoff and landing, altitude was constant at 26,000 feet. On the runway prior to takeoff, signal-to-noise was 30 db but dropped rapidly after takeoff. Single particle signals were apparent at all times when

not in the volume mode. Laser current fluctuations were much less frequent than on previous flights and frequency stability was better and overall system performance was better despite having low aerosol density in the atmosphere.

The fourth flight was the second Beta flight and took place on 17 June. The location is shown on the chart included and the flight path similar to Beta #1 flight, starting at 3500 feet and executing a racetrack pattern climbing at 500 feet per minute up to 39,000 feet altitude. The airborne digital data acquisition (ADDAS) computer input for true air speed was not available during the first half of the data taking period and speed had to be put into the computer manually but everything went very well. Again single particle signals were apparent to the maximum altitude with volume signals up to 22,000 feet. The laser performed very well with only minor discharge current fluctuations. The current was the same as the previous day indicating constant pressure in the tube and power was up slightly to 5.6 watts at the telescope.

OBSERVATIONS AND RECOMMENDATIONS

The bias voltage on the detector varies inversely with its current. If laser current fluctuations or anyting else changes resulting in laser power variations, the bias boltage will vary accordingly. This results in a changing noise and signal level at the signal processor. This can be disastrous when signal amplitudes are the prime data point as in the Beta system. A bias assembly can be obtained that will hold a constant voltage with only the current changing as a function of local oscillator power. Also, in conjuction with this, a preamplifier that has provisions for applying the bias to the detector through the first

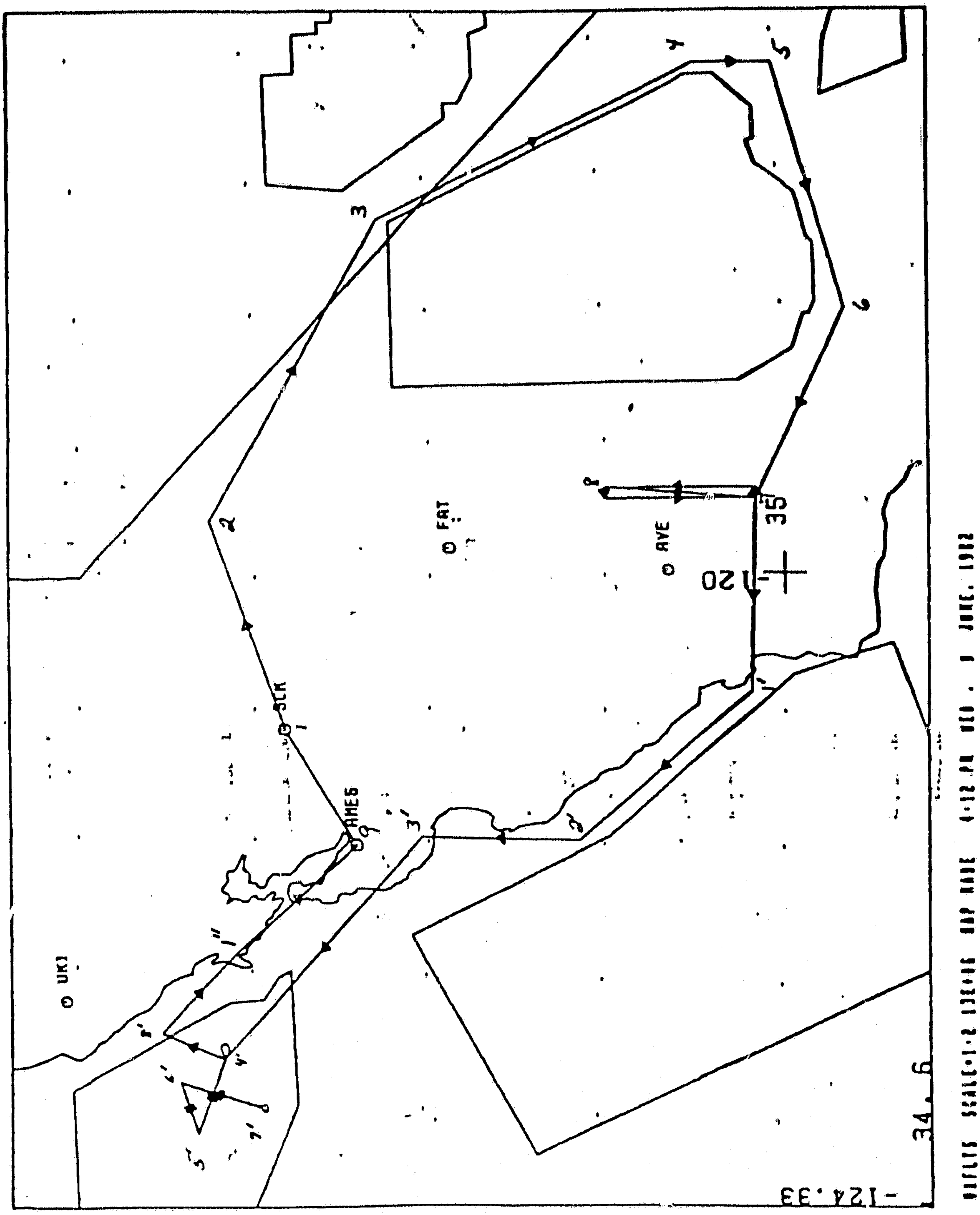
stage can also be obtained. These changes would result in increased signal-to-noise and a stable input to the signal processor.

Since the Beta system is primarily and amplitude measuring system, it is imperative that the laser have a constant output power level. Improvements to the present laser system can be made by adding a current regulating circuit to each power supply. This will eliminate the ballast resistor networks and provide a constant current level to the laser. If the existing power supplies prove not to be suitable for the Beta experiment, much better supplies are available at a lower cost, such as the Hypotronics.

If it turns out that more extensive modifications can be made to the Beta experiment, then substitution of the Hughes waveguide laser would enable a great reduction in system size and weight by eliminating the separate cooler and power supplies. Recent experience indicates the waveguide stays on one transition and should need only the Lansing stabilizer to achieve excellent amplitude stability. Also the waveguide lasers are amenable to isotope gas mixtures for operation at other wavelengths. The spectrometer should only be necessary to determine the laser output wavelength initially and need not be an integral part of the total Beta package. Incorporation of the waveguide laser would enable a significant reduction in the size of the laser/optics package which is of great importance in a flight experiment.

W. Jones

MAAPS #1



FLT NO.	RADIO CALL	DATE	FROM	TO	PLANNED T.O.	ACTUAL T.O.	PILOT	
990	NASA 712	10 JUN 82	NUQ	NUQ	1700 Z		DRINKWATER	HARDY
GROSS WT.	FUEL LBS.	MISSION FUEL	RESERVE FUEL		RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR	ENGINEER
							GA	KOSIK

FLIGHT LOG AND PLANNING CHART

FLIGHT LOG PAGE 1 of 2

FLIGHT PLAN

TO. COORDINATES	TO. IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
37-50 121-10.2	SCK	116.0 / 107	D / 7260	SOLNG SCK	87	:14					
38-15 119-35	MVA 239/75	115.1 / 98	7260	054	79	:12					
37-16 117-19	BTY 300/39	114.7 / 94	260	102	123	:18				425	
35-25 116-14	HEC 002/3.9	112.7 / 74	260	139	123	:18				425	
35-00 116-15	HEC 026/16		260	167	25	:04				425	
34-37.9 118-03.8	PMD	114.5 / 92	260	242	93	:13				425	
35-10 119-27	BFL 207/26	115.4 / 101	5,000	279	75	:12				@375	BEGIN RACETRACK
36-00 119-22	BFL 322/34		5,000	350	50	:10				325	
	BFL 207/26		5,000	170	50	:03 :10				325	
	BFL 322/34		12,000	350	50	:03 :09				@350	CLIMB RATE 1200'/MIN
	BFL 207/26		12,000	170	50	:03 :08				400	
N 35-11 W 120-52	AVE 222/52	117.1 / 118	7260	255	70	:10				425	
N 36-08.3 W 121-59.5	SNS 194/37	117.3 / 120	260	301	80	:12				425	
N 37-01.7 [illegible]	SNS [illegible]/29		260	343	54	:08				425	

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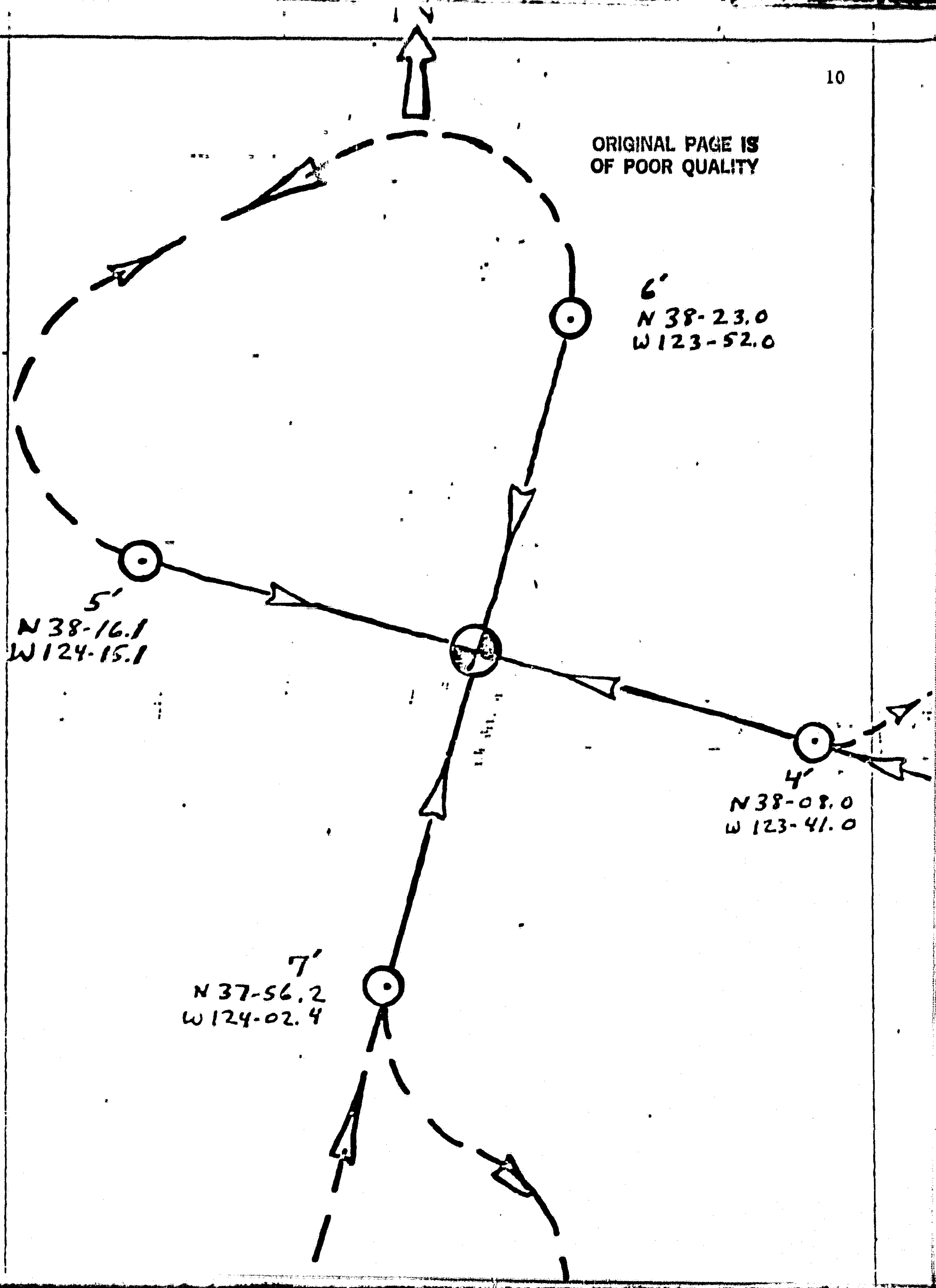
A/C TYPE	RADIO CALL	DATE	FROM	TO	PLANNED T.O.	ACTUAL T.O.		
	NASA 7							
GROSS WT.	FUEL LBS.	MISSION FUEL	RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR	ENGINEER	

FLIGHT PLAN

FLIGHT LOG AND PLANNING CHART

FLIGHT LOG PAGE 2 of 2

TO. COORDINATES	TO. IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
38-16.1 124-15.1	UKI 207/66	112.3 / 70	260	270	28	:04				450	
38-23 123-52	UKI 197/49		✓	045	19	:04 :03				450	
39-56.2 124-02.4	PYE 244/56	UKI / M2/77	✓	180	28	:04				450	
	UKI 197/49		✓	360	28	:06 :04				450	
	UKI 207/66		✓	225	19	:04 :03				450	
UKI 150/59	PYE 258/39		✓	090	28	:04				450	
	UKI 207/66		FL160	270	28	:06 :04				400	
	UKI 197/49		✓	045	19	:04 :03				400	
UKI 192/77	PYE 244/56	113.7 / 84	✓	180	28	:04				400	
	UKI 197/49		✓	360	28	:06 :04				400	
	UKI 207/66		✓	225	19	:04 :03				400	
UKI F0/59	PYE 258/39		✓	090	28	:04				400	
38-30 123-30	UKI 187/35		11,000		25	:04				375	
38-04.8 122-52.0	PYE		11,000		36	:06				375	


6'
N 38-23.0
W 123-52.0
5'
N 38-16.1
W 124-15.1
4'
N 38-08.0
W 123-41.0
7'
N 37-56.2
W 124-02.4

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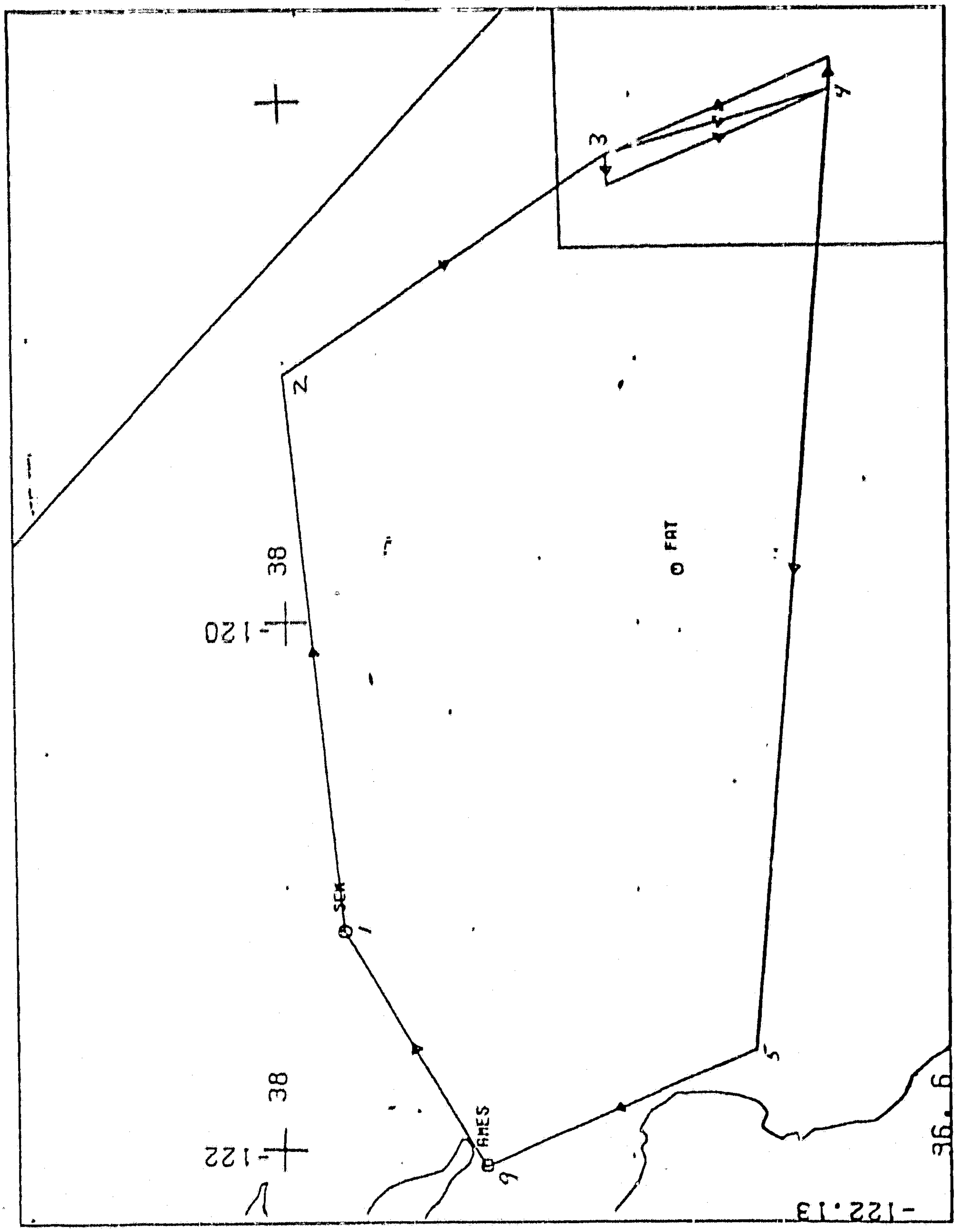

UVFLTS SCALE=1 1.09E+06 MAP MADE 12:08 PM FRI. 11 JUNE. 1982

FUEL LBS.	MISSION FUEL	RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR	ENGINEER
					Gonzalez GM	STAHL

FLIGHT LOG AND PLANNING CHART

FLIGHT PLAN: TO		FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	FLIGHT LOG: GROUND SPEED	REMARKS
	IDENTIFICATION										
37-50 121-10	SCK		7240	SOLNG-SCK	89	:14					
38-00 119-07	MVA 214/59		390	Ø67	100	.14				425	
37-34 119-14	OAL 135/60		6500	128	63	:11				@375	START PATTERN CLEARANCE FOR
36-26 118-00	GTY 235/64			146	40						COMPLEX 2 & 3 FROM 1800Z TO 2000Z
DELAY	RACETRACK #2 & #3					1:35					
36-39.9 121-31	SNS		39Ø	26Ø	176	:24				45Ø	
37-25 122-03.5	NUQ			318	48	:30					TOTAL 3h 08m
						3:09					

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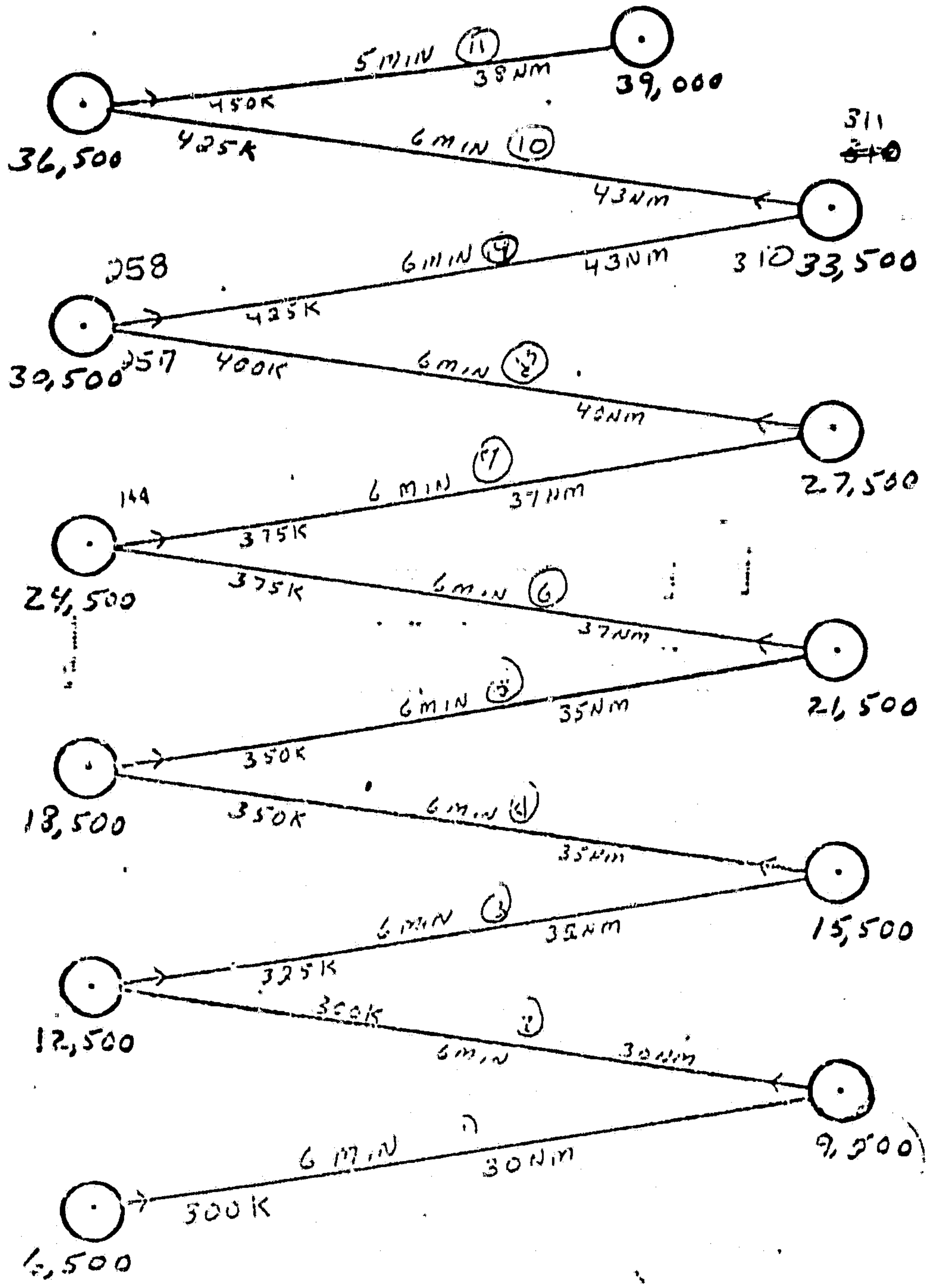
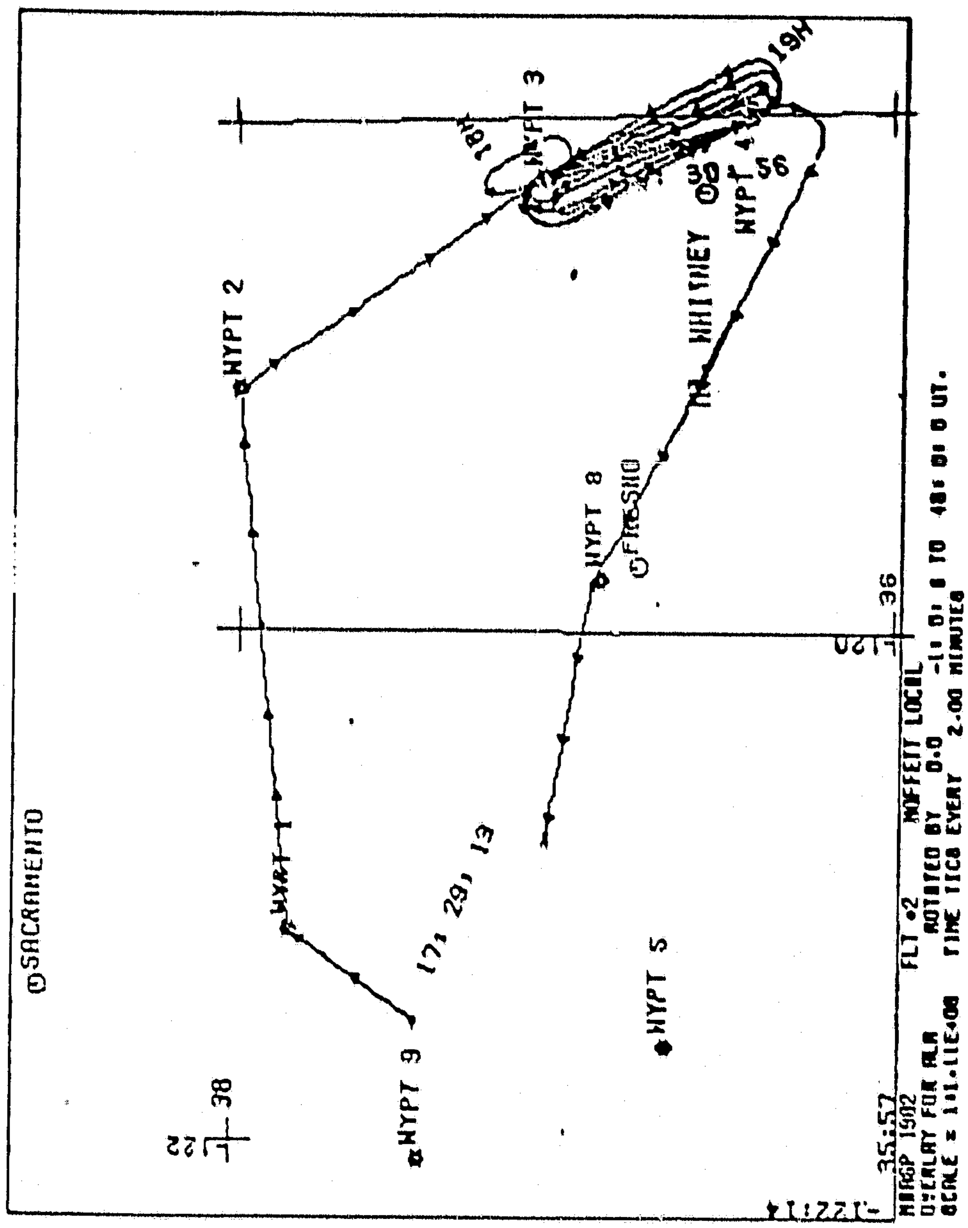
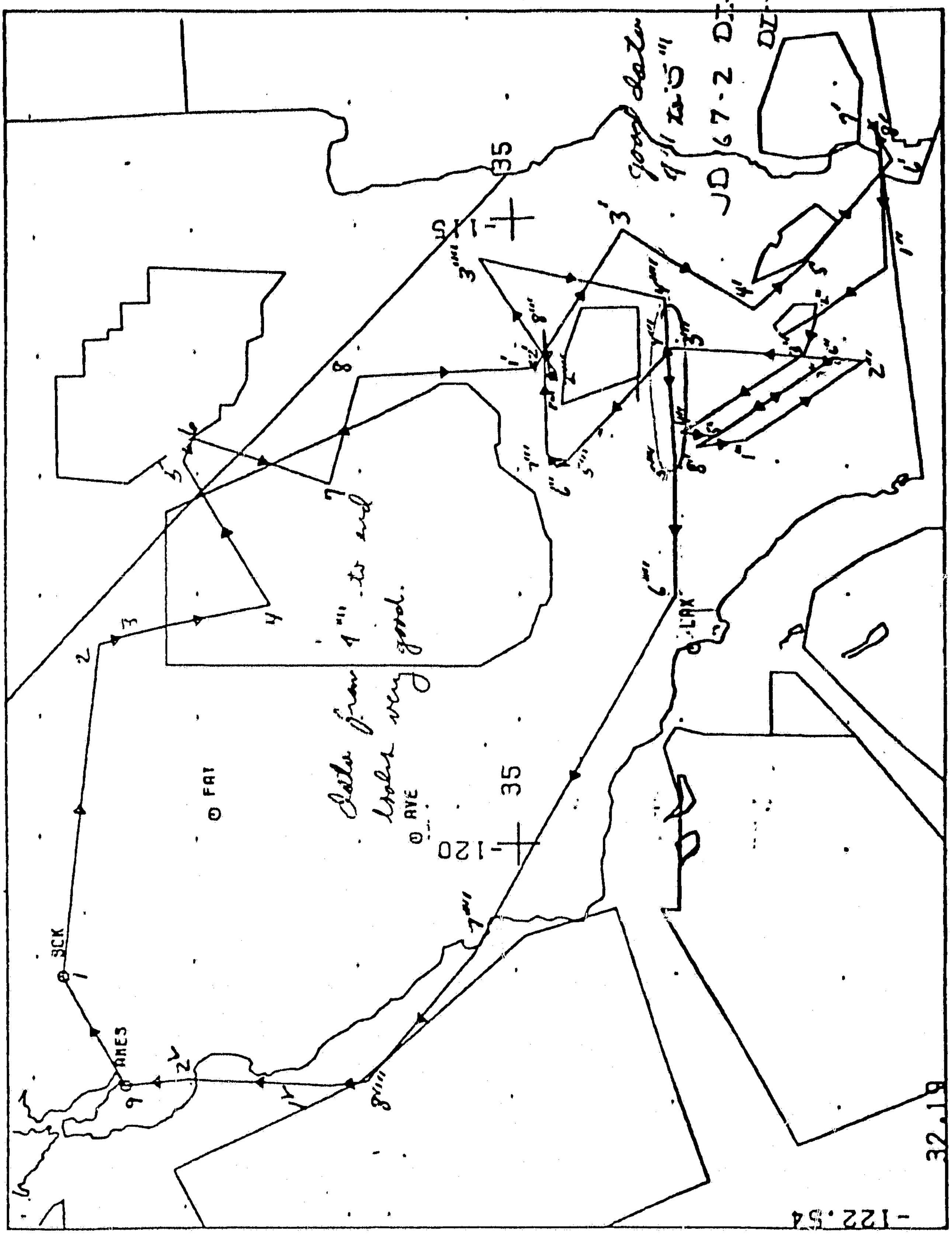
1 LEG OF 5 MINUTES = :05
10 TURNS 3 MINUTES EACH = :30
TOTAL 1:35




SACRAMENTO
WYPT 2
WYPT 3
WHITNEY
WYPT 8
WYPT 5
WYPT 9
17, 29, 13
36
38
120
35:57
FLT 2
MOFFETT LOCAL
TIME TICS EVERY 2.00 MINUTES



SCALE=1 2.375E+06 MAP MADE 11:48 AM TUE., 15 JUNE, 1982

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OSS WT.	FUEL LBS.	MISSION FUEL		RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR GM	ENGINEER KOSIK

FLIGHT PLAN — FLIGHT LOG AND PLANNING CHART — FLIGHT LOG PAGE 1 OF 3

TO: COORDINATES	TO: IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
37-50 121-10.2	SCK	116.0 / 107	7260	SOLNG. SCK	82	:14					
37-38 118-25	OAL 218/33	117.7 / 124	260	Ø77	133	:19				425	
37-26.7 118-20.2	OAL 2Ø2/43		✓	145	12	:01 :02				✓	START BISHOP
36-34.5 118-06.4	BTY 243/67	114.7 / 94	✓	151	54	:Ø8				425	END
37-05.1 116-54	BTY 321/19		✓	Ø45	66	:01 :Ø9				✓	
37-01.0 116-43.3	BTY 352/13		✓	Ø98	10	:Ø1 :Ø2				✓	START DEATH VALLEY
36-11.2 117-02.1	BTY 19Ø/41		✓	185	54	:01 :Ø8				425	END
36-00 116-15	LAS 25Ø/53	116.9 / 116	✓	88	43	:Ø6				✓	
34-55 116-12	HEC Ø46/15	112.7 / 74	✓	163	64	:Ø9				✓	
34-51.5 116-08.8	HEC Ø63/16		✓	133	5	:01 :01				✓	START AMBOY
34-19.4 115-17.0	EED 215/42	115.2 / 99	✓	1Ø7	54	:Ø8				425	END
33-33.5 115-46	IPL 331/5Ø	115.9 / 106	✓	2ØØ	51	:Ø8				✓	
33-15.4 115-25.9	IPL 354/3Ø		✓	123	23	:01 :Ø3				✓	START ALCODONES 1
32-40	BZA	116.8		117	[illegible]	:Ø8				420	

FT TYPE	RADIO CALL	DATE	FROM	TO	PLANNED T.O.	ACTUAL T.O.		
	NASA 7							
OSS WT.	FUEL LBS.	MISSION FUEL	RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR	ENGINEER	

FLIGHT LOG AND PLANNING CHART

FLIGHT PLAN

FLIGHT LOG PAGE 2 OF 3

TO. COORDINATES	TO. IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
32-44.7 114-25.3	BZA 089/10	116.8 / 115	260	222	7	:03 :01				✓	START ALCODONES 2
32-44.7 115-28.7	IPL 000/2	115.9 / 106	✓	256	54	:08				425	END
33-10 115-50	IPL 313/30		✓	311	32	:05				✓	
33-15.1 116-07.2	IPL 301/43		✓	275	15	:02				✓	START BORREGOS 1
33-58.8 116-44.0	PDZ 069/40	112.2 / 59	✓	311	54	:08				425	END
33-42.9 116-45.8	PDZ 085/39		✓	174	10	:02 :01				✓	START BORREGOS 3
33-04.2 116-09.1	IPL 287/38	115.9 / 106	✓	130	54	:08				425	END
33-10.1 116-14.2	IPL 291/44		✓	311	7	:03 :01				✓	START BORREGOS 2
33-53.8 116-50.9	PDZ 077/34	112.2 / 59	✓	311	54	:08				425	END..
33-36.9 116-47.8	PDZ 101/41		✓	157	15	:02 :02				✓	START BORREGOS 4
32-53.2 116-11.2	IPL 270/35	115.9 / 106	✓	130	54	:08				425	END
34-02 116-04	HEC 142/50	112.7 / 74	✓	351	63	:02 :09				✓	
34-05.3 116-07.7	HEC 144/46		✓	297	3	:01				✓	START JOHNSON VALLEY

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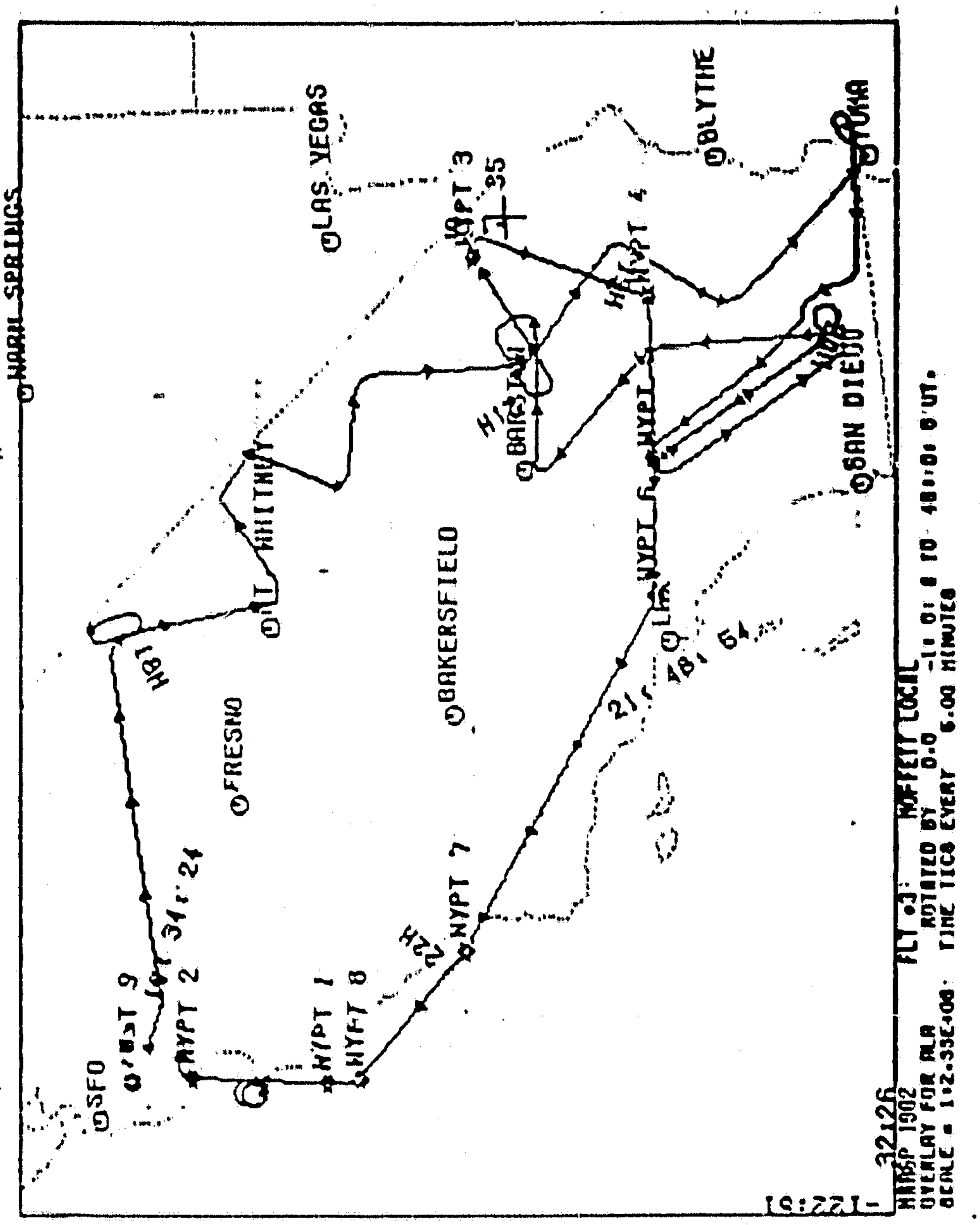
NASA 7						NAVIGATOR	ENGINEER
GROSS WT.	FUEL LBS.	MISSION FUEL	RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.		

FLIGHT PLAN

FLIGHT LOG AND PLANNING CHART

FLIGHT LOG PAGE 3 OF 3

TO. COORDINATES	TO. IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
34-45.5 117-00	HEC 249/27	112.7 / 74	260	306	7	:01				✓	
34-48.9 116-53.3	HEC 258/21		✓	040	5	:02 :01				✓	START PISGAH
34-48.9 115-54.6	HEC 072/28		✓	075	54	:08				425	END
34-47 116-18	HEC 081/8		✓	249	18	:03 :03				✓	
34-44.7 116-14.3	HEC 089/12		✓	106	6	:03				✓	START KELSO
35-13.0 115-19.1	EED 289/49	115.2 / 99	✓	043	54	:08				425	END
34-04 115-40	BLH 288/53	117.4 / 121	✓	179	69	:02 :10				✓	
34-02.6 116-57.8	PDZ 061/29	112.2 / 59	✓	255	63	:01 :09				✓	START UPLAND
34-02.6 118-02.2	LAX 058/21	113.6 / 83	✓	255	54	:08				425	END.
35-16 120-54	AVE 227/51	117.1 / 118	✓	283	162	:23				✓	
35-55 121-57	SNS 184/48	117.3 / 120	✓	292	64	:09				✓	
36-08.3 121-59.5	SNS 194/37		✓	336	11	:01 :02				✓	START MONTEREY
37-01.7 121-59.5	SNS 303/28		✓	343	54	:08				425	END
37-25 122-03.3	NUQ		✓	335	24	:20					TOTAL $5^h 19^m$


WARM SPRINGS
LAS VEGAS
BLYTHE
YUMA
WHITNEY
BARSTOW
FRESNO
BAKERSFIELD
SAN DIEGO
SFO
WYPT 1
WYPT 2
WYPT 3
WYPT 4
WYPT 7
WYPT 8
FLT #3: MOFFETT LOCAL
TIME TICS EVERY 5.00 MINUTES

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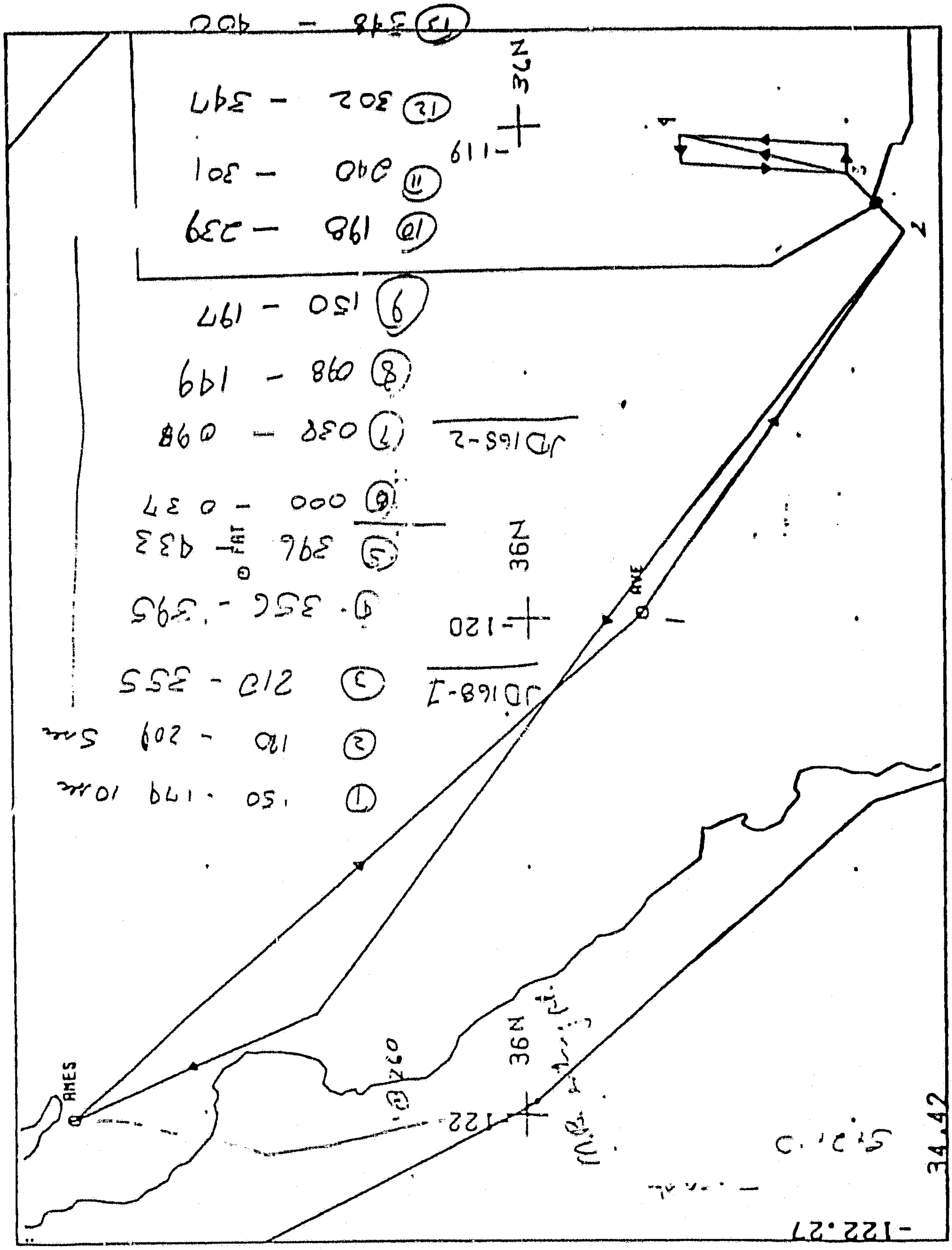
MAAASP4



GROSS WT.	FUEL LBS.	MISSION FUEL	RESERVE FUEL	RUNWAY TEMP.	PRESS. ALT.	NAVIGATOR	ENGINEER
						GM	STAHL

FLIGHT PLAN — FLIGHT LOG AND PLANNING CHART — FLIGHT LOG

TO. COORDINATES	IDENTIFICATION	FREQ	AIRWAY / ALTITUDE	MAGNETIC COURSE	DISTANCE	ESTIMATED MINS TO CHECK	ESTIMATED TIME OVER CHECK	ACTUAL MINS TO CHECK	ACTUAL TIME OVER CHECK	GROUND SPEED	REMARKS
35-38.8 119-58.6	AVE	117.1 / 118	D / 7250	SOLN to AVE	15	:25					
34-50 118-27	PMD 288/23	114.5 / 92	10,000	106	90	:16				@350	
35-00 118-13	PMD 326/23		3500	034	15	:03				300	1800Z TO 2000Z CLEARENCE IN R-2505
35-30 118-03	BFL 073/51	115.4 / 101		360	30						COMPLETES 1, 2 & 3
DELAY RACETRACK BETWEEN #3 & #4						1:44					
34-50 118-27	PMD 288/23	114.5 / 92	390	214	15	:02				450	
36-39.9 121-36.1	SNS	117.3 / 120	390	291	188	:25				450	
37-25 122-03.3	NUQ			318	48	:30					TOTAL $3^h 25^m$

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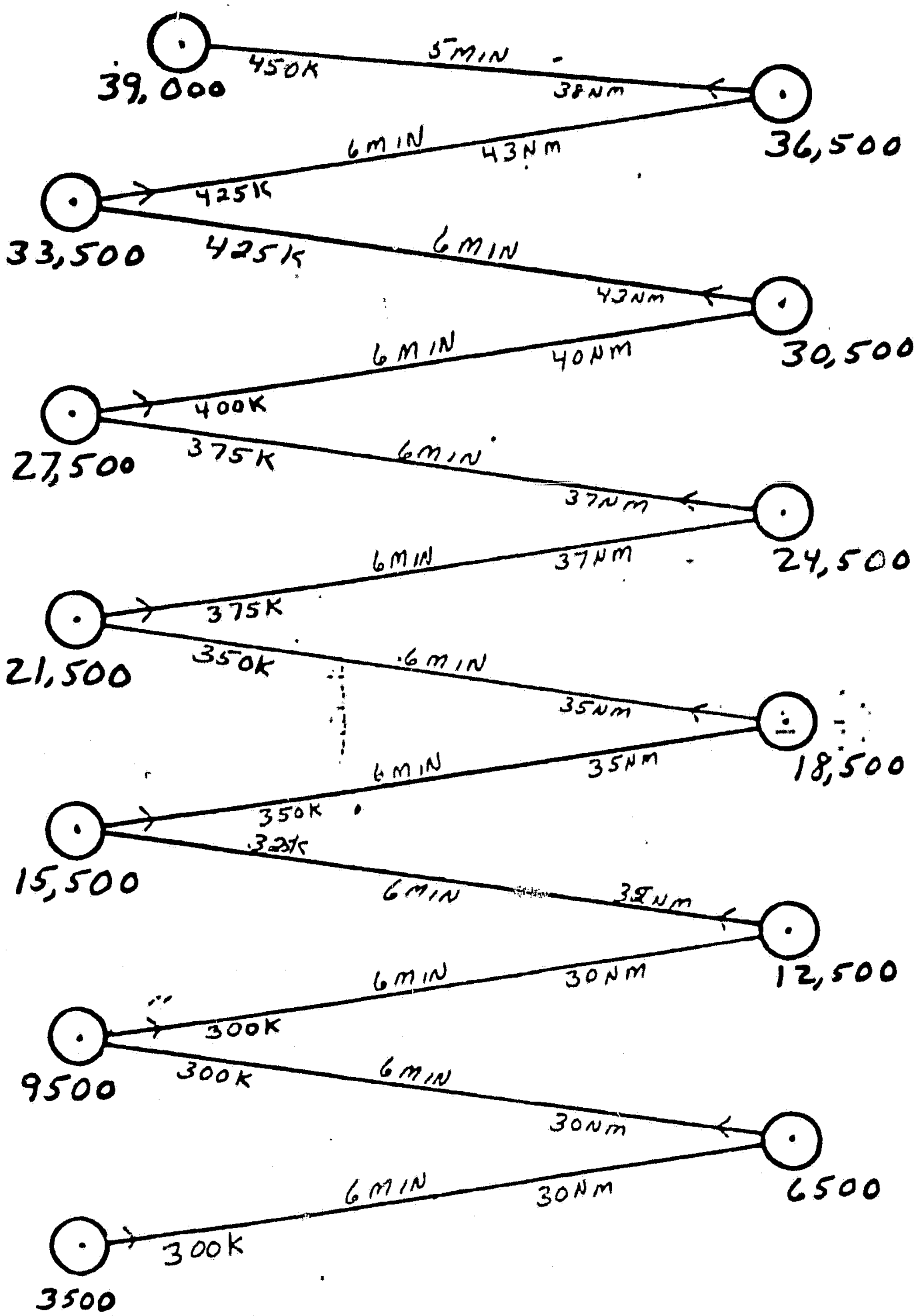
1 LEG OF 5 MINUTES : :05
11 TURNS 3 MINUTES EACH = :33
TOTAL 1:44



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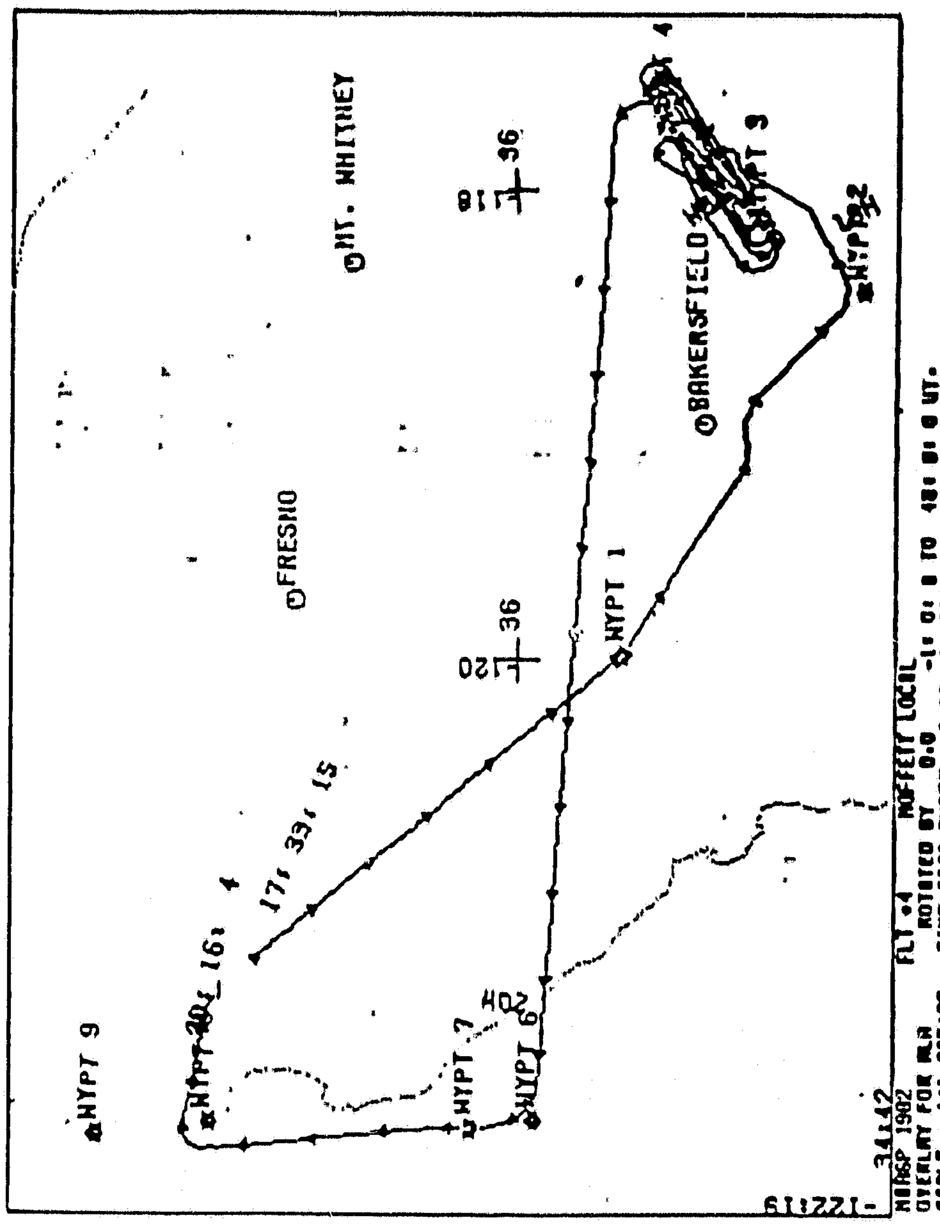

SUMMARY OF BETA FLIGHTS OVER CARIBBEAN

NASA-AME's Convair 990 was scheduled to leave Moffet Field on Monday 12 July but was delayed one day because clearance for landing at Kingston, Jamaica had not been received. The plane left on Tuesday 13 July and flew directly to Miami. Data was gathered for the duration of the flight. The computer crashed twice but came back up right away. The laser had been pumped and refilled on Wednesday 7 July and operated satisfactorily except for occasional current fluctuations.

On Wednesday 14 July, the 990 took off for Kingston, Jamaica. Shortly after take off, the GFCI breaker to the laser rack tripped shutting down that part of the system. The system was restarted after resetting the breaker and shortly thereafter the decision was made to return to Miami due to problems with #1 engine.

Repairs were made in Miami and on Thursday 15 July the 990 took off once again for Kingston. When high voltage was applied to the laser, it would only draw half the normal current, i.e. 10 ma @ 3400 volts as compared to 20 ma @ 3400 volts normally. This was probably due to moisture condensing on the equipment. After about 15-20 minutes it operated normally. Due to an oversight, the IF gain and filter bias were not set initially and the data gathered during the first part of the flight may be garbled. New settings were entered at the beginning of the fourth floppy disc.

The flight on Friday 16 July out of Kingston was over Jamaica with the first 30-40 minutes flown in circles until the L-Band radar could by repaired. Beta data was gathered throughout the flight

with the computer crashing three times and laser current fluctions occurring more frequently, varying from 17 to 22 ma. A sharp blow to either power supply would correct the problem momentarily, so it appears that one of the power supplies is the cause rather than the supply from the plane's converter.

On Saturday 17 July the flight was once again over Jamaica. Data was taken continuously with no computer problems but laser current fluctuations were worse, varying from 15-21 ma. The IF gain had to be adjusted often in order to keep total particle count in the range of 10,000/2 seconds.

A direct flight was made on Sunday 18 July from Kingston to San Juan, Puerto Rico at 33,000 feet altitude. The Beta system operated satisfactorily with the exception of the usual slow warmup of the laser and persistent current fluctuations.

On Monday 19 July a L-Band radar flight was made over Puerto Rico. At the end of the flight a Beta run was made starting at 26,000 feet and running the usual racetrack pattern climbing at 500 ft/minute. The run started with Disc 200-7. There were no clouds and the particle count was as low as 15-20/2 seconds. The computer crashed at altitude 37,400 feet on item #465 and the run was terminated.

The first Microwave Pressure Sounder (MPS) experiment run was made on Tuesday 20 July. It was made over the ocean in an area as clear of clouds as possible. The runs started at 500 feet above the ocean and went up to 36,000 feet. Particle count was fairly high, 1000-1500/2 seconds at 36,000 feet. Laser current fluctuations were

worse, varying from 13 to 21 ma.

The next flight was on Thursday 22 July over the Dominican Republic with a stop at Santo Domingo for 3 hours for JPL public relations activities. The laser appeared to be dying during the flight back to San Juan so it was pumped and refilled after landing at San Juan and operated satisfactorily for the remainder of the trip. When first run after refill, the current was 20 ma at 3,150 volts producing 4.5 watts.

The second MPS flight was made on Friday 23 July with the pattern the same as before. GFCI breaker kicked out on the computer rack shutting down the system. The computer was reinitiated in time to start the run at 500 feet above sea level with data taken up to 36,000 feet as before. Laser current fluctuations continued to be bothersome.

The last flight in the Caribbean area was made on Saturday 24 July over the Dominican Republic again. The flight lasted 5 hours, all at 26,000 feet.

The flight from San Juan to Denver was made on Monday 26 July. Altitude was 33,000 feet and the weather was cloudy most of the way. The Beta run was made at Denver's Stapleton Airport on Tuesday 27 July with take-off at 0630 hours. It was raining and clouds persisted up to 39,000 feet. The racetrack pattern was run southeast of the airport center as specified originally. The weather probably precluded any correlated data from the ground stations. The flight back to Moffet was at 39,000 feet.

The equipment was removed from the plane on Tuesday 27 July and was packed as per instructions and left to be shipped back to MSFC

via air freight. The data was packed in a protective container and shipped via priority Government mail.

COMMENTS

High humidity while on the ground caused slow laser warm up. On two occasions air conditioning vans were provided one hour before take off and this alleviated the problem. The laser power supplies should be repaired to eliminate laser current fluctions. The cause for the computer failures was not noted but was not particularly troublesome.